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# Objectives and instruments of a common policy for scientific research and technological development

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CONTENTS

# Preface
# of Mr Spinelli,
# Member of the Commission

The common R&D policy is a subject which the Community has been attempting to tackle for years and one which it has so far not succeeded in either writing off completely or putting into practice.

It cannot be written off because there is a very widespread realization that the limited funds spent on R&D within the Community will not be used to the best advantage as long as they are devoted to merely national ends; furthermore, the Community already has powers and responsibilities in the matter of nuclear research.

On the other hand, it cannot be put into practice because a narrow interpretation of the Community's tasks has hitherto prevented it from debating the subject in depth and drawing the appropriate conclusions. The Community has hitherto been restricted to managing as best it can the limited sector accorded to it by the Euratom Treaty. But the scope, content and industrial implications of nuclear research, as of any other type of research, cannot be assessed apart from industrial and research policy as a whole, and this pigeonholing has hitherto occurred only at national level. The inevitable consequence is that the common nuclear research policy, deprived of an appropriate frame of reference, has gradually declined until it now merely forms the subject of long and futile conflicts over the stump of research left to the Community, each project being judged solely from the standpoint of national policies—the only policies which really exist. The multiannual programmes prescribed both by the Treaty and by logic have faded into annual extensions of old programmes with no wider prospects.

The "supplementary programmes", in which each State decides whether or not it will participate, have expanded at the expense of the joint programmes. The Community has now reached a point where it has a few research projects but no policy, even in the limited nuclear field.

However, the time to put an end to this unhealthy situation seems to have come. In all the countries of the enlarged Community there is a feeling that the Community's mission cannot be limited to the management of the present common policies, but from now on must be the achievement of a wider and fuller economic unification, including a joint scientific and technical policy.

Furthermore, the imminent ratification of the Treaty of Accession of the four new Member States brings to an end the period in which attention was entirely concentrated on the enlargement of the Community, to the conclusion of the task of deepening the foundations.

In this new political climate, the Commission has decided to ask the Council finally to tackle the question of scientific research and technological development on a down-to-earth basis. It is not asking the Council to begin by analysing the treaties in order to determine what they permit in their present form, and thence to decide what joint projects are permissible, but rather to decide what R&D policy is required for the Community as a whole, how the common and national projects must be coordinated in order to promote unity

between the nations, and what joint instruments—administrative and financial—are required. Only when basic agreement has been reached on these matters will it be possible to prepare, discuss and approve a detailed practical programme, in full realization of the fact that its implementation will sometimes call for the application of the Treaties in their present form, sometimes require a recurrence to the procedure of Article 235 of the EEC Treaty, and sometimes necessitate the use of the more complex procedure of Article 236. But all this can be done if it is known where the Community wants to go and why.

In particular, before the end of the year the Commission must present, and the Council approve, the multiannual programme of the Joint Research Centre. After an objective examination of the role which the JRC can henceforward play within the framework of an overall policy, the Commission has concluded that it can and must be redirected to new nuclear activities and a growing proportion of non-nuclear activities of recognized joint interest. The proposed reduction in size is not, and must not be, seen as a first step towards liquidation, but rather as the painful but necessary prelude to convalescence, and a requisite of its future development. But a programme for the conversion of the JRC makes sense only if the JRC is considered as an instrument of an overall research policy. Otherwise it is difficult to foresee anything but an interminable series of annual prolongations, solving nothing and remedying nothing.

For all these reasons the Commission presented to the Council on 14 June 1972 the draft resolution published here, togetheer with the necessary explanations.

Altiero Spinelli

# Communication of the Commission to the Council

# I. INTRODUCTION

The European Community is today in the process of enlargement; it is a good time to define its objectives afresh. The Commission believes that the coordination and fostering, at Community level, of scientific research and technological development should be one of the first priorities for the enlarged European Community, in order to increase the efficiency of the Community's scientific and technological infrastructure, and relate its programmes more closely to socio-economic needs. This objective—an initial stage in the implementation of a common R&D policy—postulates a gradual harmonization of national policies and the organization of cooperation arrangements now and in the future.

For some years this objective has been recognized by Member States as both desirable and practical.

As long ago as 1965 the Community's Medium-Term Economic Policy Committee set up a Committee on Scientific and Technical Research Policy (the PREST Committee) and briefed it to "study the problems that would be posed by the formulation of a *coordinated or common policy* for scientific and technical research, and to propose measures to enable such a policy to be put in hand, bearing in mind such possibilities as may exist for cooperation with other countries ...[1]".

These terms of reference were confirmed, clarified and amplified by the Council of Ministers responsible for research at their first meeting on 31 October 1967 and when they met again on 10 December 1968.

Furthermore, in adopting the Second Medium-Term Economic Policy Programme at the end of 1968, the Council of Ministers of the Community[2] approved the measures proposed by the PREST Committee for defining and implementing a common R&D policy.

Finally, at the Hague Summit Conference (1 and 2 December 1969), the Heads of State and Government of the member countries reaffirmed their readiness to "coordinate and promote industrial research and development in the principal pacemaking sectors, in particular by means of common programmes, and to supply the financial means for the purpose".

Outside the field of information and scientific documentation, no tangible action has been taken *at Community level* to implement all these initiatives and decisions.

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[1] In particular, by making a general comparison of national R&D methods, plans, programmes and budgets.

[2] In addition, the Council meetings of Ministers for Research on 30 June and 6 December 1969, 23 July, 13 October and 16-17 December 1970 were all used by Member Governments as opportunities to stress their interest in the expansion of European scientific and technical cooperation and the extension of the Community's R&D activities to non-nuclear fields.

In view of this, the Commission submitted to the Council in November 1970 a "Note concerning overall Community action in the field of scientific and technological research and development"[1].

The first general note on the gradual implementation of a common R&D policy gave rise to inconclusive discussions during the uncertain period of the negotiations on enlargement.

To permit examination of this fundamental issue to recommence against a clearer background, the Commission has set out in this report a more thorough analysis of the situation and of the needs to be met with regard to R&D at Community level, together with new proposals as to the instruments which the Community would need to satisfy them.

## II. A NEW SITUATION GENERATES NEW NEEDS

### A. The present situation

The world political climate is changing radically; the demands of society on research are becoming more clear-cut, the results achieved by major R&D programmes and projects are revealing their deficiencies, and the Member States' R&D policies are coming up against the financial limitations of the nation states. These various factors combine to call for Community action to strengthen the development and rationalization of the research and development effort.

#### 1. *Europe as a technological force in the world*

The Community is now in the process of enlargement, offering a practical opportunity to work out a European R&D policy with a scope and ccoherence unimaginable for the Six. Because non-Member countries in Europe possessed major technological and industrial capabilities, many collaborative technological projects have been conducted outside the Community framework; enlargement of the Community will enable these efforts to be rationalized. Moreover, if the countries of the enlarged Community wish not only to achieve their own objectives of economic and social development, but to play a significant role in world affairs, they will need to acquire—through coordination or pooling of their potential—more power and negotiating capacity than their own national resources or markets provide.

At the same time, the relations between the European Community and the United States are changing; relations are beginning to take shape between the Community and China which may well bring about considerable modulations in the global balance of power; Japan's strength is growing; markets in the Eastern—bloc countries are becoming more accessible. All these factors are

[1] See Supplement 1/71 — Annex to Bulletin of the European Communities 1/71.

now having, and in the near future will have even more, direct effects on that "competition through innovation" in which the technologically advanced countries are engaged.

Whatever the outcome of the trade negotiations with the United States, the next ten years will witness the opening-up of European markets to manufactured products from the developing countries, as is already happening in the case of textiles. In the same way, on the general economic plane, new competition conditions will be created, with a growing transfer of traditional industries to the less-developed countries. These factors will force the European countries to take more energetic steps to boost their advanced technology industries. Thus, unjustified duplication and triplication, prestige companies with no economic or social yield, or even an adverse yield, programmes abandoned for want of adequate industrial structures or a large enough market are painful experiences which must not be repeated. More than ever, in this changing context, it will be important for the European Community to be a creative and innovative force.

## 2. *Changes in social needs relating to R&D*

Having been involved for over twenty years in a vast competitive race through innovation, initiated and sustained by the world's biggest powers, all industrialized countries have been obliged—to a great extent—to shape their R&D policies according to the objectives which the United States, and to a lesser degree the USSR, have set themselves.

Thus the options chosen hitherto by European countries at the national level or on a cooperative basis have been chiefly designed to meet the needs of defence, international power or economic growth; often these aims were of interest to only a few favoured sectors.

In following the directions chosen by the two largest powers, despite their lesser resources, European countries have:

— in many sectors, lagged behind the major international technological developments, very often failing to become competitive;

— sometimes neglected research aimed at meeting the needs of the community as a whole, e.g., public health and preventive medicine, town planning, transport, telecommunications, etc.;

— too often underestimated the dangerous side-effects of certain technological developments;

— regarded the transfer of scientific and technical knowhow to the developing countries as being of secondary importance.

As awareness of these possibilities grows, society's demands on science and technology have tended to change towards programmes designed to serve the

needs of society in a more balanced and direct way than many of the grand objectives pursued over the past decades.

In response to this pressure, European governments are tending to modify their science and technology policies and adopt more diversified programmes, geared to social needs shared by European countries or closer to the realities of economic life (public health, transport, telecommunications, electronics, etc.).

The satisfaction of collective needs obliges the States concerned to make this kind of re-adjustment. Both more profitable in the broad sense of the word and more nearly universal—hence also less narrowly national in their possible aims or impact—the options mentioned lend themselves better to international cooperation, particularly in the framework of the Community.

### 3. *Major national and European programmes and projects*

While the development of big programmes and projects of advanced technology—nuclear, space, aeronautics, data processing, etc.—has appreciably reduced the potential for financing schemes more directly useful to the economy or society, the choices have at times revealed a gap between investment and return.

In several cases, not only has the stimulus expected to be given to the economy by these major operations failed to materialize; their small amount of actual spin-off has proved to be out of proportion to the resources committed and the hoped-for gains.

Yet programmes of this kind are sometimes of such considerable political or economic interest (strengthening notably independence and competitiveness) that it would have been sensible for the countries of Europe—in view of the scale on which resources have to be mobilized in order to cross the threshold—to examine systematically together the selection of such projects, sharing out the work and the costs over a wide range of activities. All too often, however, these projects were embarked upon in competition with each other, and backed by insufficient resources, on a national basis.

In the few cases in wich large-scale cooperative projects on a European basis were decided on, they were launched, after intergovernmental studies and discussions, and frequently carried out disjointedly, as opportunity or occasion arose. This ad hoc method followed by all the countries concerned has created a network of disparate, and often ineffective, projects. Largely as a result of this situation, certain European cooperative projects are now in a state of acute crisis.

The enlargement of the Community should permit this whole question of major programmes to be reappraised both at national and European level, in order to redefine the objectives and the ways and means which should be favoured.

4. *The limits of national resources*

The explosive growth of scientific and technological knowhow in the last few decades has opened up many new avenues for research and generated ever-growing opportunities for innovation. Public funds allocated at national level, on the other hand, after more than ten years of marked growth, are now tending either to level off or to remain constant as a fixed proportion of GNP.

Decisions at national level (on R&D projects), which were difficult enough even when budgets were expanding, are being made harder from year to year by these mutually opposing factors; the situation obliges Community countries to make a systematic attempt to rationalize the use of their limited resources.

In the past this need to rationalize has brought into being a number of proposals or programmes for cooperation in big science and big technology; today it is putting pressure on science and technology budgets as a whole. In consequence, European countries are being increasingly constrained to consider all new projects of some size solely in the light of the possibilities of carrying them out on a cooperative basis. The growing number of possible or desirable options enhances the need to think together about the priorities to be chosen at European level and about ways of harmonizing national and Community methods of deciding such priorities.

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Two final points emerge from an analysis of the R&D policies conducted hitherto by the countries of Europe:

— While the past fifteen years have been an experimental period, rather than a period of achievement, for European technological cooperation, and though setbacks and crises have characterized most of the ventures undertaken so far, the balance sheet for this kind of collaboration nonetheless has a positive side. As we show in more detail in the next Chapter, pure research projects, which were not subject to pressure from industrial interests, were often on balance sucessful. Even among the few industrially-oriented projects which were carried out within a stable structure, there were some successes. The very fact of these successes shows that European cooperation cannot be assessed solely by reference to its failures. These were mainly due, moreover, to inadequate definition of objectives, to building these objectives on the shifting sands of compromise between separate national interests, or to faults of structure, or to the absence of a real common market.

— The growth in the number of multinational industrial firms—particularly in the key sectors of industry—is already an important factor which those responsible for R&D at national level must weigh up when they define programmes to be carried out in collaboration with industry.

## B. The needs to be met

In the new situations outlined above and under pressure of social demands, the countries of Europe will need—when deciding on their R&D priorities—to strike a fresh balance between the aims of power and prestige on the one hand and those of economic and social progress on the other.

The Community countries—like all industrialized nations— have to face now, and still more in the years ahead, many simultaneous needs (which frequently transcend the sphere of R&D, but in all cases make extensive demands on it):

*(a) The extension of scientific and technical knowledge:* Fundamental research, the fruits of which are the very "capital" of technological progress and whose vitality ensures that the States which support it can assimilate promptly all knowledge acquired in the world of science, is still the basic activity which has to be continuously promoted.

This type of research is the first stage in the advancement of knowledge, and one of its inherent characteristics is a high degree of independence and wide decentralization, both of inception and execution. It therefore requires a special form of back-up to ensure that it develops continuously and dovetails into the complex process of technical advance[1].

*(b) Social advance:* The following may be mentioned:

— Expansion of research aimed at benefiting man and society (health and preventive medicine, agricultural research, safety at work and in transportation, social sciences, etc.).

— Conservation or improvement of the environment and rural development.

— Optimizing the exploitation of natural resources.

— Transforming large conurbations to create living conditions to meet the changing needs of Europeans (new types of dwelling, urban infrastructures, etc.).

— Building new infrastructures: energy generation, storage and distribution; telecommunications networks; new, high-speed or high-capacity transport services; data-handling networks; depollution centres for international river basins or the seashore, etc.).

*(c) Development of advanced technologies for economic ends:*

— Nuclear energy (e.g., advanced reactors and uranium enrichment), data processing, aircraft, space, new means of transport, exploitation of the sea, etc.

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[1] Cf. Ch. III, A.

— Development and application of new or under-utilized technologies in the majority of industries, including the most traditional: steelmaking, textiles, food, motor vehicles, chemicals, etc.

To illustrate, industrial firms could derive many and substantial benefits from the application of data processing and numerical control techniques planning, management, improved shopfloor productivity, improved distribution, etc.

*(d) Mastery of progress:* Finally, the need, or rather the necessity, for science-based societies to consider the human consequences of scientific and technical progress and its repercussions on the practial conditions of existence in the future appears even more fundamental.

To try to anticipate, as far as possible, it is essential that there should be continuous reflection on these consequences: repercussions on the Community of accelerated world population explosion resulting from the progress of medicine, excessive growth of energy production by polluting processes, exhaustion of national resources, physical and psychological nuisances arising from the indiscriminate exploitation of technical progress, etc.

From year to year the need also emerges more strongly for the developed countries to question the use to which new powers, which scientific progress will give them, in the medium term will be put: interference in climate, action affecting life itself, mass psychological conditioning, and so on.

While the main problems which communities will have to solve in this respect concern values and ethics, scientific and technical research could nevertheless help mankind to master the progress which it has originated.

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In order to determine now in more practical terms the possible guidelines and instruments to be employed in the progressive implementation of a common R&D policy, it is necessary to learn the lessons from past experience of European cooperation.

Numerous cooperative projects have been carried out in recent decades by European countries. An examination of this period of apprenticeship may serve in particular to throw light on the strengths and weaknesses of the instruments so far used and thus provide guidance on the tools to be considered for the future.

## III. LESSONS FROM PAST EXPERIENCE — THE WAY AHEAD

### A. Experience in fundamental research and basic research

There is a great deal of experience available in this field.

In "big science", CERN is the best example of a successful organization set up to meet the need for major experimental equipment whose cost was beyond

the resources of any one European country. The essential aim pursued by CERN—to make its installations available for common use to a large number of experimenters from national institutions and universities—has resulted in an appreciably higher degree of rationalization and a higher standard of individual and collective work in European high-energy physics.

The possession of this joint facility has made it possible for Europeans to work in the most advanced fields and to cooperate on equal terms with the United States and the USSR.

In the field of thermonuclear fusion, another successful programme, of a very different character, is to be credited to Euratom. Here no common instrument was necessary and cooperation was ensured by means of a vigorous Committee which effectively coordinated the national programmes through contracts of association. Originally consisting in a simple exchange of information, this programme was progressively developed and transformed into a large Community programme embracing practically all the civil programmes of the Member States.

Similar methods were used in the biological sciences to implement Euratom's Biology and Health Protection Programmes.

The European Molecular Biology Organization (EMBO) is an example of a different kind of success. This organization began modestly with the aid of private funds, and then developed with the backing of the European Conference on Molecular Biology, in which 13 countries participated. For some years it concentrated on promoting the movement of research workers between European laboratories and on the improvement of certain advanced techniques. Today the Conference and the Organization are completing a project for a European Molecular Biology Laboratory which will develop new and costly technologies in this sector.

The range of examples of successful scientific cooperation in recent years is not limited to these three fields. ESRO has been carrying out most important basic research in the space sector. The scientific academies of the European countries have developed useful exchange programmes for research workers.

Experience gained with CERN, EMBO and the Euratom Fusion and Biology programmes thus shows that European cooperation in the fields of fundamental research and basic research can work and bring benefits.

The successes achieved also make it easier to define the forms of cooperation which could fruitfully be exploited in the future.

Firstly, it is obviously in the interests of the Community countries to rationalize investment both in large scientific instruments and installations (large radio telescopes, optical telescopes, research reactors of the beam and pulsed type) and in major programmes.

The methods used for CERN, namely, the construction of a new joint centre, may not, for that matter, be the only way of meeting a European scientific requirement. Consideration can also be given to the utilization of existing large national instruments or centres as a European facility, partly subsidized by the Community, on condition that it acts as a reception centre for research workers from other countries[1].

Moreover, it would also be useful to apply to other fields of research the methods used for EMBO or the Biology and Fusion programmes. In particular, there is a need to increase efforts and funds designed to ensure the mobility of research workers between Member States which is essential for sustaining contacts between European laboratories. Here a special effort has to be made to overcome the administrative difficulties and career and social security problems which still exist.

Another seemingly modest European task would be to help research workers to meet one another through seminars, summer schools etc., and to organize reception centres where research workers can exchange results and experience in their sectors where such exchanges are inadequate today.

Such primary processes of mobility and communication lead logically to a third process—the development of concerted or jointly operated programmes. These, as experience shows, may take various forms but always have common features. These features consist essentially in the distribution of research work among different laboratories or teams, not only to avoid duplication but so that complementary efforts to crack problems lead to a cumulative advance.

For such programmes, an element of common financing[2] is essential (to ensure the essential coordination and to keep the programmes on the lines of agreed objectives), through it is not necessary for common funds to form a predominant share.

The list of fields where these techniques and methods could well be applied is long; examples are:

*Large instruments*

*(a)* Astrophysics and cosmology, where research on pulsars ant the integration of quasar signals require powerful radio telescopes which can only be constructed by multinational action. Similarly, research on the propagation of gravitational waves calls for large installations on which cooperation would be warranted.

*(b)* Ion accelerators and nuclear reactors with intense neutron beams (continous or pulsed).

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[1] Access to these instruments could also be granted to research workers from non-Community countries.

[2] Through contracts of association, for example.

*Concerted or joint programmes*

*(a)* Solid-state physics, where intensified cooperation on a European scale would appear to be urgent, bearing in mind the variety of the programmes to be developed.

*(b)* Medical research, where an urgent need exists for "accelerated innovation" over a very wide range of subjects, such as molecular pharmacology, the neurosciences, the function and diseases of the brain and central nervous system, cancer, antiviral chemotherapy, congenital deformities, biomedical engineering, epidemiological research, preventive medicine, rehabilitation and the early diagnosis of diseases.

*(c)* Fundamental research in the interests of the developing countries. Under the scientific aid programmes for the developing countries an effort should be made to coordinate the basic research appertaining to these countries but carried out in the Member States.

A valid instrument for examining and, depending on need or desirability, satisfying the requirements of cooperation of this type would be represented by a European Science Foundation; this would be an autonomous agency and would not be intended to replace existing centres and associations but to back up projects and increase their efficiency by measures of coordination. Its tasks and functions and its institutional structure are described in Chapter V of this document.

## B. Experience of the existing Big Technologies

The examples of CERN, EMBO and the Euratom Fusion and Biology programmes have shown that cooperation in fundamental research can work well, partly through the absence of any conflict of commercial and national interests. It is a very different matter when technology reaches the stage of industrial application, where it then becomes deeply involved with market forces, powerful industrial structures, commercial interests and political power. At this stage, technological policy must of necessity be integrated in a wider industrial policy in conformity with priorities of a political order.

The Big Technologies, where the potential scale of development has already outstripped the public resources, markets and national companies of European States, today represent wide areas for cooperation: aeronautics, space, data processing, telecommunications and nuclear energy are examples.

In each of these sectors, efforts to date have brought to light inherent strengths and weaknesses which provide different lessons in each case.

In aircraft, industrial production programmes are dominated by a number of bilateral or trilateral ventures: ventures developing aircraft project by project, on an excessively costly basis. Experience tends to show in this field that the

full benefits from a pooling of European resources can only be obtained by an effort of development carried out—in full awareness of the civil airline markets—by a small number of European transnational companies each under a single management.

In the space sector, European organizations do exist and offer the best means of using available resources fruitfully, (despite the current failure to agree on a common strategy among European states). The cooperative effort in this field has suffered particularly from the absence of agreement on long-term objectives (does Europe need its own launchers? Under what conditions can it agree to use American launchers?), which in turn is due to differing views on external policy and differing attitudes towards the main partner, i.e., the United States.

In the nuclear power industry, besides Euratom's activities, a number of agreements on the development and commercial production of reactors and on fuel enrichment and processing reflect the pressure for economies of scale. Europe's main needs in this field are today basically of an industrial nature. The incoherence of the network of agreements concluded could have been avoided or limited if Euratom had been able to offer a more effective basis. However, since Euratom was mainly designed at the outset as a research and development instrument, it has not been able to adapt readily to industrial requirements mainly owing to the excessive complexity of its structures and its slow decision-making procedures. Moreover, its difficulties of adaptation are in some measure attributable to differences of strategy between the Member States which have themselves led to a continuing jeopardization of its institutional authority and its powers, and to restrictive interpretations of the Treaty establishing it. Euratom has thus demonstrated all the problems which arise from the promotion of action devoted to a single sector in the absence of a general industrial policy framework.

In the computer industry, the lines contemplated by the Member States for a single programme for the production of a giant computer have proved incompatible with company strategies. However, the pressure of external competition is pushing the firms concerned to seek economies of scale at a European level. The same pressure is at work when it comes to obtaining markets and development funds of sufficient magnitude. Even though, in this sector, national mergers and public financial aid combined with preferential contracts have enabled a limited number of European firms to survive, these practices have also raised obstacles to the regroupings of associations which alone could make this European industry viable.

However different the lessons may be which can be drawn from these various experiences, they do have one aspect in common. It is clear that research and development policy for such industries needs in every case to be framed in accordance with a sector policy for the industry concerned. It is, moreover, necessary to ensure that research and development programmes in these industries serve the chosen common objectives, avoiding waste and duplication

and helping to open up markets and rationalize production at European level. These are only some general lines, but the present report is not the place to describe in detail the many issues of industrial policy on which the Commission is preparing proposals for individual sectors on the basis of its 1970 memorandum.

In short, there is first, a need, in each of these major sectors of technology, to work out sector R&D policies defined in accordance with the industrial policy objectives adopted. In particular, without common policies for individual sectors, national action would slow down the processes of forming transnational European companies and lead to the persistence of political competition between States, to the detriment of economic and technical competition between industrial groups.

The role of the Community institutions with regard to these sector R&D programmes seems clear. Where an existing independent European organization is already functioning satisfactorily, there is no reason why it should be taken over or absorbed by the Community. Nevertheless, as these large-scale programmes should have some place in a global strategy, however or wherever they may be implemented it is the task of the Community to propose methods of cooperation and to act as a catalyst for new projects adopted in or by the Community.

Thus the Community and its institutions could employ a wide range of methods of action.

In the case of space, the existing European organizations will almost certainly provide the future framework for joint efforts in which the members of the enlarged Community must try to develop a common strategy on this important subject. In any event, further efforts should be made to concentrate all the various tasks in a single European space organization, a particularly difficult operation since it involves arriving at new basic choices in common—and it is precisely on such choices that the countries of the enlarged Community are divided.

An objective analysis of the fundamental conditions might, however, encourage the necessary alignment of the Member States' points of view. In the coming months, when the countries of Europe will have to define their role with regard to the post-Apollo programme, the members of the enlarged Community will have a good opportunity to try to find and define a common approach.

In the other sectors (aeronautics, telecommunications and data processing, for example, for which the Commission is preparing proposals), the projects often attain such dimensions that they would have to be considered case-by-case by the Community and the Member States because the varied requirements arising in these sectors might call for quite varied solutions: the creation of independent agencies, the conferment of Joint Undertaking status, the esta-

blishment of European public services, Community financial aid, concerted action, etc.

Finally, in the nuclear sector, for which the Commission is also preparing proposals, both the lines to be adopted for research and development and the industrial and market organization would need to be examined. This twofold examination should be considered in the light of the Community's general objectives for energy supply and should cover in particular:

— thermonuclear fusion and technology of fusion reactors;

— advanced reactors;

— uranium enrichment;

— the organization of the industry, with a view to the development of large transnational units which can compete on a world scale.

In these various fields, the industrial development contract formula might in some cases prove an appropriate instrument. However, the Commission feels that, in the initial experimental phase, this should be used only for small-scale projects. Experience alone will show whether the use of such contracts can be extended to larger scale projects.

### C. Technologies of promise — applied research and technological development

Outside the major sectors of technology—in which it has been possible to derive lessons from past efforts—there are great many new technologies which in their pre-industrial phase of development call for cooperative action, in particular whenever the development of a new product or process involves the participation of laboratories or companies based in a number of member countries.

An example of the pre-industrial phase is the next stage in the development of thermonuclear fusion.

At this stage of development, when costs are rising, distribution of tasks and sharing of the increased expenditure will become even more important in Europe. The techniques developed by the Euratom "Fusion" group will need to be extrapolated and as the fusion reactor approaches the industrial phase, an increasing part of the development work can usefully be transferred to industry.

In this initial stage of development there are many potential areas for a joint European endeavour.

These can be divided into R&D schemes in the public interest and schemes aimed at the market.

*Research and development of "public service"*

In accordance with the considerations emphasised in the first part of this document, the *environment* sector calls for common or coordinated R&D efforts to back up a wider European Community policy on the subject[1]: ecological studies on what happens to pollutants and their effects in continental and marine environments, research on pollutants toxic to man, improvement and harmonization of methods of pollution measurement and control, development of liquid and gaseous effluent purification processes and development of less- or non-polluting technologies and products—all subjects of common concern.

Moreover, water shortage is becoming more acute, owing to a rapidly growing demand and the increasing pollution of reserves. The need for research into desalination techniques for sea and brackish water (reverse osmosis, electrodialysis, freezing) is being felt accordingly.

Such studies might take a variety of forms: Community action, concerted action, development contracts to help industry develop the necessary technologies.

Community action in this field could both combine and coordinate the already considerable efforts launched in various countries and could stimulate new research in cooperation with private or public laboratories or the Euratom Joint Research Centre.

In view of the urgency and major interest of the development of oriented research in this sector, the Commission proposes to undertake Community action in this field in 1973. Joint or Community programmes linking fundamental research, oriented research and industrial research should be started as soon as possible; this action should be backed by the award of scientific and technological research contracts. Details of this proposal will be found in Annex II, "Environment", of the draft resolution attached to this report.

New means of transport form another major subject for future activity. Here the COST Group has already commissioned the OECD to carry out a study.

Potential areas of common interest for Community projects include :

— *Urban transport systems.* Useful results might be achieved if a European "Cities Programme" were drawn up (similar to the "Cities Programme" in the USA) under which each city within the group would try out the development of a city system (electric cars, continuous belts picking up waiting vehicles, free conventional public transport and so on) and would share costs and result.

— *Interurban transport systems.* Here any Community support must be designed not only to develop new technologies but to promote the development of compatible systems.

[1]See JO C 52 of 26.5.1972 and Supplement 5/72 to the Bulletin of the European Communties.

Finally, there is an obvious world need for the transfer of technological know-how to the developing countries. This includes the development of intermediate or adapted forms of technology with an appeal for developing countries (simple farming equipment, industrial products, together with manufacturing systems and equipment appropriate to the level of education of the population). The Community is confronted with this pressing need and should envisage the implementation of a suitable common programme, linking up both public laboratories and private industry.

*Technologies of promise aimed at the private market*

While it is easy to produce a list of public needs in Europe for which new technologies would have to be developed, the creation of new products aimed at the commercial market is primarily the concern of industry. In this field the possibilities are boundless. The range extends from textile machinery though welding technology to numerically-controlled machine tools.

An illustration is provided by *superconductors*, which open avenues to such sectors as high-energy, plasma and solid-state physics, space generators, flux pumps for very high currents (over 10 000 A), computer electronics, superconductor memories, electron optics.

More generally, the first task for the Community is to create conditions favourable to innovation and facilitate cross-frontier cooperation when this appears necessary. There is in particular a manifest need in this field to assist companies in funding the initial stages of development of new projects, in reponse to proposals which they may put forward at Community level. It is therefore necessary to determine the type of instrument to be defined and established for this purpose, e.g., scientific and technological research contracts, granting of Joint Undertaking status, cooperation between the authorities of the various countries.

There is also an obvious need in these fields for venture capital to help firms developing new technologies.

Finally, in the case of both oriented research of public interest and industrial research, there are "horizontal" technological fields, the development of which is of considerable importance to the Community. Mention may be made in this connection of earth resources, energy supply and materials.

To meet the continous growth in energy supply requirements, the enlarged Community should make a special effort.

The absolute priority given today in the United States to research in this field confirms the importance of a vigourous effort to this end.

The accent in this field should be placed on two categories of research:

(1) Research to ensure an improved yield from production, processing, transport, storage and utilization of energy. The general aim is to reduce the gap between gros primary consumption and net final consumption by cutting losses, which would contribute to the three objectives of safety, economy and environmental preservation while ensuring optimum utilization of earth resources.

(2) Research to discover new sources of energy, new resources or new uses for known resources, the accent being placed in this case too on the advantages of security, economy and preservation of the environment.

The materials field would especially require an immediate cooperation effort in view of the pressing and varied needs expressed in the Community by scientific circles, public services and industry.

Basis factors of technological development in many sectors of materials (metals, ceramics, composites, etc.) would call for Community action with a view to:

(a) increasing the efficiency and yield of research carried out at national level in the Member States, by promoting joint consultation and coordination of programmes;

(b) facilitating the circulation of data on the properties of materials necessary for materials research, production and utilization;

(c) stimulating industrial cooperation.

As in the case of research on the environment, this type of subject would call for joint and Community planning and action linking fundamental, oriented and industrial research. To this end, the Commission proposes that it should undertake such action and that it should have the financial resources to enable it to award the necessary scientific and technical research contracts to the public and private centres interested.

Details of this proposal are given in Annex III, "Materials", of the draft resolution attached to this document.

## IV. TOWARDS A COMMON R&D POLICY

In order to satisfy these many substantial requirements, the countries of Europe will have to formulate and implement R&D policies of unprecedented complexity and diversity.

In consequence, considerations of efficiency, rationalization and economy will assume increasing importance in the years to come in the selection of options and programmes, and in deciding how they are to be implemented. In formulating their R&D policies, therefore, countries will have to maintain a careful balance between national, European and international projects.

They will need to achieve balance and coherence on social, economic and technical grounds for the better use both of national and of Community resources.

The member countries of the enlarged Community, having decided to establish jointly an economic and monetary union, have in this respect an obvious interest in gradually pooling their efforts in order to satisfy their immense requirements in R&D matters at less cost and in the best way.

## A. Progressive Definition of a Common R&D Policy

In the definition and implementation of R&D projects in the Community, the Community itself neither can nor should do or centralize everything. Any common R&D effort must leave plenty of scope—in some sectors a predominant amount—to the free initiative of national public establishments, universities and firms. A common policy should generate common projects only in those cases where the need for them is acknowledged.

For example, the Europe of molecular biology is not the same as the Europe of petrochemistry or data processing. The differing degrees of development of R&D in European countries, the lines followed at national level and the features specific to the various research activities create a situation where it is impossible to draw in advance a definite permanent outline.

If it is to be effective, an R&D policy must be flexible and permit use to be made of all modes and types of cooperation (restricted and limited-participation agreements, concerted projects carried out by very large consortia, joint projects, etc.).

Hence, although a common R&D strategy needs to be defined by the countries which have decided to form a community and to achieve jointly agreed aims if that strategy is to be consonant with the trend towards European integration, it can only be effectively implemented if it embraces a group of national projects, or of joint or Community projects and concerted international projects, of various kinds.

The diversity of ways and means to be used accordingly increases the need for coordination between the Community countries.

Briefly, however desirable the establishment of a European scientific and technological community may be, it can only take place gradually.

The bulk of public appropriations for research and development are now allocated by the member countries to national programmes carried out on a national scale. Europe is and must remain a polycentric geographical region, while achieving its unification.

*EEC — Central government appropriations for R&D: 1967-71*

| | Germany | France | Belgium | Italy | Nether-lands | EEC |
|---|---|---|---|---|---|---|
| Total R&D appropriations | | | | | | |
| — 1967 (millions of u.a.) [1] | 1 220 | 1 790 | 103 | 286 | 209 | 3 608 |
| — 1971 (millions of u.a.) [1] | 2 139 | 1 819 | 165 | 498 | 349 | 4 970 |
| Contributions to international, multilateral and bilateral projects | | | | | | |
| — 1967 (millions of u.a.) [1] | 139 | 237 | 21 | 60 | 14 | 471 [2] |
| — 1971 (millions of u.a.) [1] | 196 | 178 | 18 | 49 | 15 | 456 [3] |

[1] At current rates of exchange.
[2] i.e., 13.1% of total public expenditure in the EEC in 1967.
[3] i.e., 9.2% of total public expenditure in the EEC in 1971.

In the light of these general considerations, it is possible now to define what is meant by a "common R&D policy" in practical terms.

## 1. *The choice of common aims — harmonization of national policies*

On the basis of forward studies and medium-term forecasts, the Community countries would have to work out the R&D objectives for adoption at Community level in accordance with the socio-economic needs to be met.

These choices, made after joint studies and discussion, would enable the desired coherence and complementarity to be maintained between national options, options to be determined at Community level and international projects in which the Community would participate.

This endeavour to define common medium-term objectives would have to be supplemented by the fulfilment of another task. The diversity of the programmes financially supported by the Member States is not, under present conditions, conducive to genuine technical and economic competition. Because of the size of national public markets competition is often a political or prestige matter. Similarly, experience shows that the national choices made by the authorities dictated by short-term industrial and political considerations lead to duplications not justified by motives of economic competition and cause a certain wastage of financial and human resources, without ensuring a satisfactory balance in the distribution of research activities or advanced industries throughout the Community.

Thus, a practical, continuing comparison on a Community scale of the R&D programmes and budgets of the Member States appears necessary in order to coordinate the national policies progressively in accordance with the chosen social and economic objectives.

## 2. *Common projects and Community projects*

On this basis, criteria would have to be settled to which all common or Community projects should conform.

In the light of the debates which have been going on within the Community on this subject for some years, it would appear possible to adopt five basic criteria:

(i) projects which, because of the scale of human and financial resources required, cannot be undertaken on a purely national basis (e.g., large accelerators, radiotelescopes, large-scale space or oceanographic programmes, uranium enrichment, etc.);

(ii) projects where development cost and sales would require a very large or organized market (data processing, aeronautics, advanced reactors, measuring instruments, etc.);

(iii) projects which are by nature international (meteorology, long-distance transport, telecommunications, etc.);

(iv) projects designed to meet collective needs common to the member countries (establishment of the European scientific and technical information and documentation network, research on the environment, urban and rural development and new means of transport);

(v) projects designed to contribute to the implementation or development of the policies adopted by the Community for individual sectors (agriculture, transport, technical standardization, policies for specific industries, etc.).

For the sake of clarity, "common" projects can be distinguished from "Community" projects by their mode of financing. Common projects would be financed in their entirety from the Community budget. The financing of Community projects would be shared between the Member States and the Community budget. Use can also be made of the terms "direct projects" (JRC type)[1] and "indirect projects" (fusion, biology)[2].

Various methods of concertation or coordination, with or without financial aid from the Community, should be used whenever that appears to suit the need for efficiency or the strategy chosen.

## 3. *Balance to be maintained at the national and regional levels*

For the countries of the enlarged Community, accepting a certain mutual interdependence in the context of a common policy does not mean giving up the location on their territory of a fair share of the first-class centres

[1] Carried out in the Joint Research Centre.
[2] Under contracts of association with national centres.

or major technological installations which the common policy would be designed to promote. It will be necessary to reconcile the rationalization of public effort and industrial competition with a fair distribution of activities troughout the Community. Thus, when the location of a major project or installation is under discussion in isolation, it generally leads to a fundamental disagreement, which may even prevent the project from being carried out. If, on the other hand, a number of major installations or projects were considered as part of a general strategy, it should be possible to ensure a fair distribution, while taking into account the existing profound inequalities which need correction in the case of certain regions.

### 4. *External relations*

The organization of an effective common attitude towards the outside world is an essential element in a policy of permanent collaboration within the Community. (In this respect space and colour television provide excellent examples of the disastrous consequences of lack of solidarity.) Such a common attitude would enable the Member States to engage in cooperation with non-member countries under the best possible conditions or to make use of technologies already developed by other States. The many new needs generated by industrial society open a considerable field for cooperation and the division of labour. It is significant in this respect that the richest state in the world is no longer in a position to pursue simultaneously—with no resources other than its own—the conquest of space, major aeronautical programmes, improvement of the environment, and so on. In this context, the adoption of common positions would in particular give the Member States and their industries a bargaining power unprecedented for them at the international level.

To ensure that this potential bargaining power gradually becomes a reality, the Member States should consult each other systematically before putting proposals on new cooperation projects to non-member countries.

Non-member countries could thus participate in all projects thought desirable by the Community, provided that they took part in the whole of the project concerned and could not question the basic nature of the proposals—such as the programmes and conditions of fulfilment—presented to them. In this respect, the Community's ability to engage in international cooperation and play a creative role in it depends on how far it can define its own programmes and policy.

As a practical example, in this new situation the COST Group could be used to full advantage as a permanent framework for negotiation with European non-member countries.

Similarly, it would be appropriate for the Member States to consult each other concerning all proposals coming from non-member countries. Whether these

were projects submitted by European or by other non-member countries, the Member States' powers of negotiation would be considerably strengthened if a common attitude could be determined. Cases in point are the post-Apollo programme and Intelsat.

## B. Necessary Powers to be granted to the Community and its Institutions

For the definition and gradual implementation of a common R&D policy, and then of an international policy of cooperation with the outside world, the Community represents a suitable and coherent framework.

It is suitable because the Community has at its disposal all the decision-preparation and decision-making machinery required for carrying out such a gradual rationalization effort. Whether at the stage of mapping out the general lines of this policy, formulating practical proposals or implementing the policy, it can offer suitable decision-making machinery, subject to adaptation of the existing legal bases and the establishment of suitable institutions. The basic infrastructure exists and it needs only some additions at an initial stage.

It is the most coherent framework because it can provide the necessary cohesion between national policies, existing or contemplated common policies (agriculture, transport, energy, industrial policy, education, etc.) and common or Community R&D activities. Similarly, since the fulfilment of common technological objectives inevitably causes discrepancies between what the participating countries put in and what they get out, the Community can offer special possibilities of compensation.

Whereas it has proved difficult, in the case of isolated projects, for each country to get back benefits equivalent to what it put in (the principle of the "fair return") there is a real possibility of achieving such a balance in the case of a combination of scientific and technical programmes—to which the principle of the division of labour could usefully be applied.

Judicious use of the Community's own resources would be particularly helpful in striking such a balance. On the other hand, the achievement of the economic and monetary union, which has already been decided, would be rendered difficult if it were not accompanied by common action in a field so decisive for the economic and social development of the Member States and consequently of the Community. In order to exploit the Community framework to the full:

(a) the Council would have to recognize that the Community's powers extended to all fields of scientific research and technological development and grant it suitable resources by means, where appropriate, of the provisions laid down in Article 236 of the EEC Treaty;

(b) the Community would have to decide what proportion of its own resources should progressively be allocated to activities of this kind.

While the bulk of these resources went to agriculture during the sixties, from the seventies onwards it would seem reasonable, if not essential, for Community activities to be promoted in a more balanced way, in view of the increased technological and industrial potential and requirements of the enlarged Community;

(c) the Council would have to decide on the projects and resources required for 1973.

Recognition of these new powers, the gradual creation of Community funds for research and development and, above all, the major social choices involved —all this would ultimately imply direct participation by the European Parliament. Only democratic control would enable general policy lines to be adopted in the light of social needs and the inevitable tendency to arbitrary technocratic decisions to be curbed.

Here the Committee on Research, Energy and Atomic Problems of the European Parliament would have a major part to play, by calling on all necessary external help and arranging hearings which would enable it to judge the value and soundness of the options and decisions contemplated.

## V. THE INSTRUMENTS OF THE R&D POLICY — PROJETS AND RESOURCES REQUIRED

As this document has demonstrated, the enlarged Community will provide an opportunity for an effort to promote R&D better suited to the considerable requirements to be met, for rationalizing the use of national and Community resources (economising financial means, sharing tasks, etc.) and for increasing the efficiency of national policies (enlargement of markets, stimulation of competition, etc.). Therefore the Community needs to provide itself as soon as possible with instruments for preparing and proposing the successive but coherent decisions which will build up the common policy for R&D and with the bodies and resources necessary for implementing them.

For this purpose two types of instrument would first have to be created or gradually adapted:

(i) bodies to assist the Community institutions in the tasks of conception, planning and preparing decisions on R&D;

(ii) instruments for stimulating R&D activities and for starting and managing common or Community actives including the Joint Research Centre.

### A. Conception — Planning — Decision-Making

*The European Research and Development Committee (CERD)*

Like all institutions which elaborate R&D proposals the Commission of the European Communities should surround itself with specialist opinion and advice, in order to carry out its job.

Just as the national authorities of European countries have set up advisory bodies on R&D—the Beratender Ausschuss für Bildung und Wissenschaft in Germany, the Comité consultatif de la recherche scientifique et technique in France, the Consiglio Nazionale della ricerca in Italy, the Conseil national de la politique scientifique in Belgium, the Committee for Science Policy in Britain, etc.—the Commission should set up its own permanent advisory body: the European Research and Development Committee (CERD).

This Committee would consist of personalities capable of enlightening and advising the Commission and would be responsible mainly for the continuous analysis of the Community's technical potential and socio-economic needs. With extensive information from all the Community countries at its disposal,[1] and members of the highest competence, this Committee could give the Commission, on an independent basis, the elements needed for interpretation and judgements when it prepares its opinions and proposals on R&D matters.

To set up this Committee, the Commission would:

(a) appoint a full-time permanent scientific advisor (two-year contract renewable once);

(b) after consulting the national bodies interested, appoint 18 advisors chosen for their general abilities in R&D fields (scientists and "users" of science from various sources).

These advisors would be chosen in a personal capacity and not as representatives of the Member States or organizations to which they belonged.

The Committee would be under the chairmanship of the Commission's permanent scientific advisor. It would have general competence in matters of research and development, including fundamental research. In the latter field it would be able to call on the opinion of European Science Foundation, which would nevertheless retain its independence (cf. below); the Committee could call on any experts of its choice to supplement its information. It could also ask the specialized departments of the Commission to organize all necessary *ad hoc* or interdisciplinary working parties for the preparation of its work.[1]

Among its tasks, the Committee would have to advise the Commission on the value of programmes undertaken or contemplated in the Member States, in the light of their cost; this work could serve as a basis for opinions, recommendations or proposals for the development, adaptation or abandonment of projects. It would also have to advise the Commission on the objectives and priorities to be observed at Community level, the relevant projects which should be adopted and the ways and means for carrying them out.

The Committee would send its reports to the Commission and periodically produce a summary of the objectives and priorities submitted to the Commu-

[1] e.g., *ad hoc* working parties for individual sectors such as agriculture, the nuclear industry, electronics, public health, telecommunications, transport.

nity. Since its terms of reference would cover the entire field of scientific and technical research activities, it would replace the Euratom Scientific and Technical Committee, as soon as the necessary procedures for revising the Euratom Treaty were completed.

To prepare the ground for Community work in R&D fields and provide permanent assistance to the Commission's Scientific Advisor and CERD, the Commission would set up its own "think tank", similar to the corresponding national units.

This unit, which would employ 10 to 15 highly-qualified people, covering a wide range of subjects (scientists, technicians, sociologists, medical scientists, urban planners, etc.), would be mainly responsible for initiating and promoting studies within the corresponding national institutes or centres[1] and for ensuring the necessary coordination in the interests of the Community concerning:

— identification of socio-economic needs common to the Member States;
— possible contributions of R&D to the satisfaction of these needs;
— long-term technological forecasts;
— possible or desirable scientific and technical options (cost/benefit analyses, human and financial resources to be planned for, etc.);
— guidance on the lines of action or subjects to be accorded priority.

*The Commission's role*

Acting on the reports and opinions of its CERD, the Commission would have three tasks to perform.

First, to facilitate the alignment and harmonization of the Member States' national and international R&D policies, it would have to draft suitable opinions and recommendations.

Secondly, it would have to draft and propose to the Council, taking into account the Community's needs, proposals for common or Community activities.

Finally, with a view to ensuring that the Member States follow a common line within other international organizations and define a common strategy with respect to non-member countries, it would have to arrange Community-wide consultations and to make all useful proposals for this purpose.

To this end, the Commission would have to ensure that all the proposals which it submitted and all the important decisions by the Council or the Member States should be drafted or adopted in full awareness of:

(a) the national and international R&D programmes;

[1] Institutes and centres engaged in medium or long-term forecasting, systems analysis or drawing up plans and programmes.

(b) the availability of manpower and funds (and the allocations made or contemplated for these funds).

Thus the Commission would have to maintain all the necessary links with the national Senior Officials responsible for defining and implementing R&D policies who could meet periodically in a "Committee for Consultation and Coordination".

It is in this framework, which brings together the national Senior Officials and the Commission representatives, that the periodical confrontation of national R&D plans, programmes and budgets should take place, to encourage an alignment of national policies and to provide the Commission with all the information necessary for it to draw up its proposals.

*The Council of Ministers responsible for research and development*

The Council of Ministers responsible for research and development, which might meet with the Ministers for Industrial Affairs for certain subjects or types of decision, would pronounce on the Commission's proposals for the common policy on R&D programmes and the budget.

To meet the wish expressed by the Council at its meeting held on 16-17 December 1970 that the decision procedures of the Community on R&D matters should be simplified and rationalized, the Commission would like the following facts considered.

The Commission feels, first of all, that it would be desirable for the Council on "Research and Development" to meet regularly to adopt not only decisions on specific or isolated projects but also to decide on the common objectives and the priorities concerning R&D policy; common or joint projects would form only one aspect of this policy.

In this connection the Commission thinks it worthwhile for a single group to replace the various groups responsible for preparing Community decisions. This group would examine at the Council's request all the aspects, whether scientific, technical, financial or administrative, etc., of Commission proposals.

The replacement by this single procedure of the many existing channels would enable the Council gradually to obtain a grasp of R&D matters as a whole and to make its decisions in full awareness of the many factors to be taken into account in the adoption of a common R&D policy.

*The European Science Foundation*

Given the special characteristics of fundamental research, which needs support rather than organization, stimulus rather than planning, a special solution is needed at Community level to the problems arising in this type of research.

The creation of a European Science Foundation seems desirable in many respects, as indicated earlier: an independent foundation which would not be designed as a substitute for existing centres and associations, but to support their actions and contribute to their effectiveness, by way of coordination.

Such a foundation, the form of which would have to be worked out with the aid of the scientific community and government officials, would have the task of stimulating European cooperation in the fields of fundamental research.

The Foundation, animated and led by a governing board composed of key figures from the major scientific institutions of the Member States, would in particular have the following tasks:

(a) facilitating mobility of research workers in sectors where this is needed;

(b) organizing or facilitating useful international meetings: seminars, summer schools, symposia, etc.;

(c) discerning themes and methods of cooperation;

(d) supporting concerted European activities and cooperative projects;

(e) identifying laboratories with the potential to become European centres of excellence and, within the limits of its resources, deciding on the grants or research contracts to be awarded to them (provided that they admit research scientists from other countries);

(f) examining national investment projects for major instruments of fundamental research (telescopes, radio telescopes, particle accelerators, intense magnetic fields, etc.). This key task could be undertaken *systematically* for every new instrument contemplated by a Member State where the cost amounted to more than, for example, 25 million u.a. Such a systematic examination would in each case be a prelude to an evaluation of the possibilities and suitability of installing the instruments in question on a cooperative basis. Decisions on such projects, in particular on a Community financial contribution, would have to be made at the level of Community institutions.

The CERD and the Commission could moreover have recourse to its opinions in formulating their R&D common policy proposals.

This Foundation would have a large measure of autonomy and, in order to carry out its various tasks, would have its own financial resources, derived from:

— annual or multiannual contributions from the Community budget;

— special contributions from public or private bodies in the Member States or in non-member states.

The Commission would have to work out the statutes and organization of this Foundation, in liaison with senior government officials and the major national scientific institutions.

## B. Management — Application and resources

The organization of Community R&D programmes would enable a solution to be found only to matters of decision preparation and adoption. However, the problems raised by the implementation of Community decisions on scientific and technical cooperation need to be considered with the same attention.

So far, the only operational instruments and financial resources at Community level relate to the nuclear and allied sectors and ECSC projects. In other sectors, there are not even possibilities—resources or structures—of starting new projects.

To solve this problem, the Commission presented the idea, based on the Resolutions of the Hague Conference, of an independent Community Agency to be endowed with its own funds: the European Research and Development Agency (ERDA).

Such an instrument would be the best answer to the many questions raised by the support, execution and supervision of common or joint projects, providing for:

(a) the general organization of projects of Community interest;

(b) the technical examination of national rules in the sectors of Community activity selected by the Council (industrial property, dissemination of information, etc.);

(c) the management of common resources intended for R&D and the award of scientific and technical research contracts according to programmes defined in common (technical inspection, exchanges of results, etc.);

(d) the management of common, joint or Community R&D projects by flexible and rapid procedures;

(e) the transfer, exchange and application of the results of research obtained under a policy defined in common;

(f) preserving business secrecy;

(g) the supervision of execution of projects, together with the competent national authorities, etc.

It appears essential to arrive at some solution of the kind in order to separate the functions of management and execution—as the industrialized countries do increasingly systematically—from the more general functions of planning and policy decision.

However, the creation of this Agency should be regarded as a medium-term solution, to be implemented when the common or joint programmes contemplated or undertaken show real diversity and scale.

In the immediate future, partial and provisional solutions should preferably be adopted, since these enable a better assessment to be made, in the light

of experience, of the percentage of Community resources which should be allocated to R&D and of the type and scale of management and executive structures to be established.

Thus, along the lines worked out in this document—showing different procedures for the various types of subject: fundamental research, oriented and applied research, industrial development and innovation, major programmes—it appears appropriate to provide the Community by 1973 with the following instruments and financial resources:[1]

*Fundamental research — Oriented and applied research*

(a) Fundamental research: the creation of a European Science Foundation, along the lines laid down above; this Foundation would be designed to stimulate European cooperation in the field of fundamental research.

(b) Applied and oriented research: starting, continuing or developing concerted European projects[2] (e.g., PREST and COST projects). Undertaking new Community projects on the environment and materials. The implementation of these new oriented and applied research projects requires that the Community should possess its own financial resources to back up their implementation and execution. These projects would have to be supported by means of scientific and technological research contracts, the relevant funds being included in the Community budget (Commission section).

Certain reasons prompt the Commission to propose that the projects on the environment and materials should be undertaken in 1973, without waiting for the establishment of the new structures proposed, thus anticipating to some extent, for these two sectors, the results of the general discussions recommended.

For the field of environment, a general proposal for the sector by the Commission is at present under discussion among the Member-States which should lead to the implementation of a common policy on the matter. The need now is to give precision to the research programmes mentioned in the general document[3] and to propose their adoption and introduction under the common policy now being discussed.

R&D in the field of materials partly conditions the development of all sectors of technological and industrial activity. As a permanent option of the industrial ized countries, the priority given to it is not a matter of choice but of necessity. Thus, given this special characteristic and the pressing and varied needs expressed in the Community by scientific circles, public services and

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[1] These financial resources are given here only for guidance, as preliminary estimates.
[2] It may be recalled that concerted European projects follow three principles: common planning, financing and execution by the participants, pooling of results.
[3] See JO C 52 of 26.5.1972 and Supplement 5/72 — Bulletin of the European Communities

industry, the Commission considers it worthwhile to propose the implementation in 1973 of an activity in this field; the precise programmes could be worked out with the experts of the Member States.

Initial appropriations for 1973 to a total of 5-6million u.a. would need to be included in the Community budget to cover these various projects.

*Euratom indirect projects*

In this category the Fusion and Biology Programmes have already been the subject of decisions so for 1973 no special decision is required on them.[1] As for other actions such as the prolongation of Dragon, the High Temperature Reactors, and so on, these still require a decision for next year.

The appropriations to be allocated to these activities for 1973 should be in the range 25-30 million u.a.

*Promotion of industrial innovation*

The *de facto* discrimination at present suffered by programmes carried out on a cooperative basis by private firms in different Member States would be eliminated by the introduction of Community industrial innovation and development contracts to support medium-scale projects, initiated either by industry or by the Community. The Commission would like these contracts to be introduced soon and will submit a proposal concerning them to the Council for a decision, on the basis of Article 235.

An initial funding of 20 million u.a. for 1973 would be needed.

*Venture capital*

The lack of venture capital constitutes one of the main impediments to the development of new technologies. Owing to the inadequate growth of the capital market and the caution of the banks when it comes to funding new technological ventures during the development phase, when the risks are highest, entrepreneurs underwriting the promotion of new technologies have difficulty in taking them beyond the concept phase to that of profitable exploitation. Certain European companies are trying to bridge this gap, but it is clear that the sources of venture capital remain very inadequate, particularly if they are compared with that available in the United States. It would therefore be necessary to supplement existing private sources of venture capital for the development of European industry with public funds.

Any solution to this problem must take into account two special criteria relevant to this type of aid. Firstly, funds of this type should not be managed

[1] Apart from modifications linked to the adhesion of new Member States.

by a public administration type of system but by an industrial or banking type of system; secondly, the individuals, teams or departments undertaking these tasks should be able to evaluate simultaneously the economic, technical und commercial aspects of the applications submitted and to perform an essential management function in their interventions.

In order to define the principles and methods of allocation of venture capital to innovating firms, it is proposed, in collaboration with the EIB, to work out definite proposals as soon as possible.

*R&D programmes for Big Technology*

In the Commission's opinion R&D programmes for Big Technology must be examined individually in the light of sectorial industrial policies. The Commission is now preparing proposals as regards the key industries of aviation, data processing and telecommunications.

In order to help the development of sector policies, the Member States should submit their projects to the Community for examination and consideration by its organs. This would indicate whether these projects could be accomplished by intergovernmental agreement without Community financial backing or whether such backing would be required. Community support might, where appropriate, also take the form of the granting of Joint Undertaking status (in conformity with the proposal made to the Council in September 1971), or of the organization of joint purchases.[1]

*Scientific and technical information and documentation*

The progressive construction of a European scientific and technical information and documentation network was the subject of the Council's resolution of 24 June 1971. This project will be pursued, and the appropriate decisions proposed to the Council, as and when required.

A Council resolution of the same date approved the creation of a metallurgical information and documentation system, the first link in the network.

The Commission's nuclear documentation system must be maintained and keyed into the network.

The funds required by the Commission in order to run or participate in these documentary systems are allocated each year in the Community budget.

[1] In accordance with one of the conclusions of the report of the Committee of Senior Officials on "Industrial Policy", recently submitted to the Council by the Committee of Permanent Representatives.

*Joint Research Centre*

The JRC is one of the instruments of the joint R&D policy, whose activities must be integrated into the Community's scientific and technical plans and programmes. The JRC must therefore receive a new direction and wider aims in order that it may be transformed into a new type of centre.

The major national and international research centres established after the Second World War were depending on their tasks, designed on various models —that of the university (basic research centres such as CERN or DESY), or the industrial establishment (centres of research and development such as Saclay, Capenhurst and Karlsruhe), or a combination of the two (Grenoble and Harwell).

The JRC, conceived as an R&D centre, would need to be transformed into a multi-purpose establishment capable of providing a research "service" designed to meet the requirements of society in many fields.

Its activities would therefore have to be geared to the following two aims:

(a) applied research for "public service" purposes;

(b) basic and long-term research.

In addition, the JRC would have to provide the technical backing for the Commission's activities and be able to do work on request for industry.

For these purposes it would require to be endowed with an adequate departmental organization.

*Public service tasks*

In the *nuclear field,* the JRC cannot overlook the fact that most reactor development work is now taking place under the aegis of industrial firms better equipped for that purpose, and that in these fields the role of the national and European centres is becoming less important.

It is still necessary, however, to provide many "public service" facilities of interest to all the member countries, such as reactor safety, control of fissile materials and reprocessing, recycling of radioactive waste, and the BCMN (nuclear measurements).

In the *non-nuclear sectors,* the main tasks to consider concern the following fields: the environment, data transmission and the Community Standards Bureau.

*Basic and long term research*

In basic and long term research a wide range of nuclear and non-nuclear tasks could be selected, concerning: the use of nuclear energy for purposes other

than the production of electricity and basic studies on materials and transuranic elements.

The reconversion of the JRC is certain to take several years. It cannot be successfully accomplished unless the necessary funds are allocated without being periodically cast in doubt or discussed at infinite length. Lastly, the ultimate size of the JRC will have to be determined by the scope and diversity of the taks to be entrusted to it.

## VI. THE DECISIONS TO BE TAKEN

This document has advanced a twofold thesis:

(a) the need to take decisions of principle at Community level concerning the formulation and implementation of a joint R&D policy, the allocation of an increasing fraction of Community resources to this type of activity and the creation in due course of the system of institutions required in order to ensure the planning, implementation and control of such a policy;

(b) the need to endow the Community as soon as possible with the initial institutions and funds required to enable it to undertake the formulation and progressive implementation of a joint R&D policy.

The Council would need to take the following steps in these matters:

— to decide on the terms of the general resolution attached to the present document;

— to debate and take up a position on the principle of an annual budget for Community R&D activities;

— to decide the activities to be continued or initiated in 1973 on the basis of a provisional budget of about 95 million u.a.[1] These activities are listed in the table given below, which states the timetable proposed by the Commission for the presentation of its proposals under the various points and the estimated cost of the activities studied;

— starting with this first programme beginning on 1 January 1973, to allocate for a transitional period of three years, an initial budget equivalent to an average of 120 million u.a.[2] a year; this would correspond to 2 % of the national R&D budgets.

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[1] To which should possibly be added the cost of the transfer or closure of ESSOR and the HFR.

[2] This sum is evaluated on the basis of present prices. It could be amended if the Community decided to undertake activities in the major fields of advanced technology.

| Subjects | Type of Proposal | Submission dates | Cost estimate (in millions u.a.) | Preliminary [1] budget 1973 |
|---|---|---|---|---|
| 1. *JRC* | – Role, function and scope of centre (Annex I to draft resolution)<br>– Programmes | June 1972<br>Sept. 1972 | 38-40 [2] | 45 [3] |
| 2. *Indirect projects* [4]<br>– Approved programmes (Biology[5], Fusion[5], completion of programme on Dragon, education and training) | – Decisions already adopted | | | 13 5 |
| – Programmes still to be approved<br>– Extension of Dragon Agreement | – Proposals for R & D programmes<br>– Continuation of R & D programme | July 1972 | 25-30 | 2 8 |
| 3. *European Science Foundation* | – Creation of new institution | June 1972 | 0 5 | |
| 4. *Participation in European PREST and COST projects*<br>– PREST Secretariat, projects on : urban development, training in data-processing, monitoring of the seriously and/or chronically ill, public health and hygiene, etc. | – Budgetary proposals, proposals for research and training programme | End 1972 | 2 5-3 0 | |
| – COST Secretariat, share in Metallurgy and Pollution projects | – Budgetary proposals, shares in projects | End 1972 | | |
| 5. *New projects*<br>– Environment [6] | – Proposals for R & D programmes (Annex II to draft resolution) | June 1972 | 2 15 | |
| – Materials [6] | – Preliminary studies and pilot projects (Annex III to draft resolution) | June 1972 | 1 0 | |
| 6. *Industrial development and innovation contracts* | – Budgetary proposals, conditions of contract award | July 1972 | 20 | |

| Subjects | Type of Proposal | Submission dates | Cost estimate (in millions u.a.) | Preliminary [1] budget 1973 |
|---|---|---|---|---|
| 7. *Studies and surveys* – Study work necessary for starting the framing of an R & D policy | – Budgetary proposals, study programme | Oct. 1972 | 1 0 | |
| 8. *Community programme in major advanced technology sectors* | No immediate proposals (the financial estimates would have to be revised if the Community decided to undertake projects of this type) | | 90 15-97 65 | |

[1] On the basis of the 1972 budget.
[2] Estimate under the assumption of conversion of the JRC (excluding costs of closure, if any, of ESSOR and HFR).
[3] Estimate under the assumption of renewal of the current JRC programmes.
[4] These estimates do not include any extension of the Community Bureau of Standards activities or any Community share in the excess cost at 1 000 MW fast breeders.
[5] Subject to changes connected with the accession of new Member States.
[6] These two projects would be supported by means of R&D contracts, the relevant funds being managed by the Commission.

# Resolution of the Council and the representatives of the Governments of the Member States on the gradual implementation of a common policy for scientific and technological research and development in the Community

The Council of the European Communities and the representatives of the Governments of the Member States,

Having regard to the Treaties establishing the European Communities,

Having regard to the final communiqué published following the Conference of Heads of State and Government at the Hague on 2 December 1969, and in particular point 9 thereof,

Having regard to the project of the Commission,

Having regard to the Opinion of the European Parliament,

Aware of the new needs in the social and economic fields and of the environmental problems in the Member States of the Community,

Anxious to place the progress achieved in science and technology at the service of the general development throughout the Community,

Desiring to take the opportunity offered by the enlargement of the Community and the realization of the economic and monetary union to concert their efforts further in scientific research and technological development,

Intending to assist the development of exchanges and international cooperation, by means of the gradual implementation of a common policy of research and innovation,

Anxious to support the implementation of an industrial policy by suitable scientific and technical actions, as indicated by the Commission Memorandum to the Council on the industrial policy of the Community,

Have adopted this resolution:

1. Agree to implement gradually a common policy for scientific research and technological development to assist the achievement of the objectives set out in Article 2 of the Treaty establishing the European Economic Community.

2. The purpose of the policy for scientific research and technological development is to lead the Community to:

— ensure the utilization, under the best conditions of coherence and efficiency, of the resources allocated to research and development activities in the fields of natural science, social science and technology;

— form a single entity in which scientific and technological activities are placed at the service of social progress and balanced economic expansion and assist the improvement of the standard of living and of the quality of life;

— define jointly priority R&D objectives to be achieved;

— develop Community activities when necessary and improve the methods and conditions of cooperation between the Member States;

— achieve gradually the harmonization of the policies of the Member States and secure the implementation of a common strategy towards non-member countries;

— increase and improve scientific and technical assistance and the transfer of information to the developing countries.

3. To these ends, the Community shall:

— be informed of all plans and programmes which involve financial aid from public funds and because of their scale or type may be of Community interest, and to these ends take all necessary steps to lay down the criteria for this information and ensure that it is received in time;

— undertake the periodic comparison and gradual coordination of programmes of the Member States;

— determine the research and development activities which can be carried out at Community level, with or without common financing;

— ensure, if need be, the promotion of fundamental research activities;

— conclude contracts for studies, scientific research and technological development;

— utilize industrial development and innovation contracts both as an instrument of research policy and of the industrial policy of the Community;

— undertake, in the case of necessity, its own action on scientific and technological research and development, for example, by the creation, support or organization of public services of Community interest;

— cause Joint Undertakings to be formed;

— harmonize the rules and procedures relating to research and development and encourage standardization;

— ensure the exchange of information on research and development between the Member States.

4. In the case of projects of particular interest to the Community the Member States shall, in pursuance of EEC Treaty Article 116, act together in international scientific and technical organizations.

5. In order to ensure the implementation of the common R&D policy as defined in points 2 and 3 of this resolution, the Council, recognizing that the competence of the Community extends to all fields of scientific research and technological development, considers it necessary to provide the Community with the appropriate resources by implementing the provisions of EEC Treaty Article 235 or 236, as appropriate.

The Commission shall periodically submit to the Council forecasts, statements on priorities, and proposals relating to the common research and development policy. On the basis of these proposals the Council will periodically decide upon the objectives and programmes of the Community and the corresponding amount of resources, having regard to the fact that scientific and technical needs will absorb a growing share of the resources of the Community in the coming years.

6. The Council considers it already advisable that the Commission :

(a) shoud include non-nuclear projets in its proposals for the next multi-annual programme for the Joint Research Centre;

(b) should put in hand research and development programmes in the environmental field, in the light of the needs stated in the proposals from the Commission regarding a general policy for the environment, and should draw up research and development programmes in the field of materials;

(c) should draw up—after consulting the scientific circles concerned—the statutes of a European Science Foundation;

(d) should put forward detailed proposals on industrial innovation contracts.

7. The Council, in view of the fact that the programme for the Joint Research Centre (JRC) must be determined in the light of a general Community policy for research and development, hereby gives its approval:

(a) to the directives and guidelines proposed by the Commission to bring about the conversion and reorganization of the JRC, as given in the document on the JRC attached as Annex I to this Resolution;

(b) to the programme of environmental research and development attached as Annex II;

(c) to the programme of studies on research on materials, attached as Annex III.

8. The Council takes note of the Commission's intention to strengthen the formulation of its proposals by setting up an advisory body in the form of a European Committee on Research and Development and liaising with the national senior officials responsible for research.

9. In order to enable the Commission to manage the research and development projects entrusted to its supervision and to implement the projects mentioned in the previous paragraph, as well as industrial innovation contracts, the Council plans to make available to it for the next three years an average amount of 120 million u.a. annually from the Community Budget.

For 1973, a first estimate of the financial resources necessary is 95 million u.a., plus the cost of transfers or closing-down of ESSOR and the HFR, being distributed as follows:

— joint Research Centre;

— euratom indirect projects;

— new projects:
  - establishment of the European Science Foundation;
  - environment project;
  - materials project;
  - share in PREST projects;
  - share in COST projects.

— Industrial innovation and development contracts.

# Annexes

I. Future role of the Joint Research Centre (JRC)

II. Project "Environment"

III. Project "Materials"

(The following papers are summaries of the documents attached to the Commission's Communication forwarded to the Council on 14 June 1972).

ANNEX I

## A. Future role of joint research centre (JRC)

### I. *Motivation*

It should be noted that research centres with very specific activities are tending to diversify their work towards sectors aiming in particular at improving the quality of life and in this way meeting the needs of society in many fields.

The JRC, which was conceived as a joint centre for nuclear research, should adopt the same approach, especially since the increasing part played by industrial interests in this field and the considerable effort being made at present in the national programmes on nuclear reactor development for electric power generation cannot be ignored.

In these circumstances, the role of the JRC as initially laid down by the Treaty needs to be rethought. It should place its competence and scientific potential in fields of Community interest at the service of society. If incorporated in the common policy of scientific and technological research and development in the Community, the JRC would become one of the instruments of this policy.

### II. *Future programmes*

To judge from the Council resolution of 21 December 1971 and consultations with interested circles in the enlarged Community, future programmes are likely to concentrate on:

1. basic and long-term research;
2. public service;
3. technical support of the Commission's activities;
4. services supplied under contract on behalf of outside organizations.

There would, however, be no question of making a clean sweep of the past, and the programme should be centered on certain scientific teams at the JRC, the specialization and experience of which are not jeopardized by this new departure.

#### 1. Basic and long-term research

Two main fields of activity can be contemplated in this sector:

(a) basic studies on materials;

(b) long-term energy supplies.

In the case of (a), the JRC's work would be centred mainly on the study of phenomena governing the performance of materials subjected to extreme conditions of use. Techniques used in condensed-state physics would be employed and to this end studies should be continued on the technology of pulsed neutron sources. The basic studies currently in progress at the Institute of Transuranium Elements in Karlsruhe would also be continued in this connection.

The forward research concerning (b) should be carried out in the context of the use of nuclear energy for purposes other than power generation. The work undertaken by the JRC on hydrogen production should be continued to this end.

2. Public service

Activities in this sector should be concentrated on three main subjects:

(a) protection of the environment;

(b) data analysis;

(c) reference standards and substances.

The multidisciplinary activities in which the JRC may become engaged in the field of environmental protection will be incorporated in the Community action programme fulfilling the requirements of the environment policy as defined by the Commission.[1]

In the field of data analysis, the JRC will extend the experience it has gained in the information centres, concerning reactor shielding and nuclear data, to the creation of other centres of the same type, notably for reactor safety. (In this field it will also provide the Community with technical backing in the form of systems analysis and the harmonization of safety standards.) The JRC will also participate in the European Program Library under the COST agreements.[2] These activities require appreciable backing in the data processing field and CETIS (the Scientific Data Processing Centre) will continue to act as a focal point, not only as a support for the JRC and Commission but also as the basis of the European computer network.

Finally, the JRC will continue to be responsible for the present tasks performed by the CBNM in the nuclear sector. Its activities will have to be extended to the non-nuclear field and this can be done under a project relating to measuring methods, standards of reference and substances.

3. Services to the Commission

With its scientific and technical capacity, the JRC can assist the Commission in the implementation of the policies which it seeks to pursue in various fields, in particular by means of systems analysis.

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[1] See JO C 52 of 26.5.1972 and Supplement 5/72 - Bulletin of the European Communities.
[2] Cooperation agreements prepared between 19 European countries at the Community's instigation.

The studies in progress at the moment concerning the development of methods of determining fissile material content are a case in point.

4. Services supplied under contract on behalf of outside organizations

A small percentage of the JRC's scientific potential could be placed at the disposal of official bodies or industries under contract, in accordance with a suitable scale of charges.

III. *Organization*

In order to take into account the part which the Commission would like the JRC to play, in view of the experience gained in 1971 and 1972, some points contained in the decision of 13 January 1971 on the reorganization of the JRC will have to be reviewed. In particular, the Commission intends to strengthen and rationalize the links between the JRC and its other departments.

## B. Conclusions

In view of the programme which may be conceived along the lines indicated above, the Commission considers that the JRC staff establishment could not include all the existing staff.

The Commission also considers it essential that research workers in the countries acceding to the Community should gradually be assimilated into the work of the JRC in order to bring the new multiannual programme into line with the enlargement. It should also be noted that the transfer of some existing staff to other research work was necessary and that the recruitment of a certain number of high-grade experts would assist the diversification of activities.

Finally, the Commission wishes to emphasize that its proposals concerning the JRC form a coherent whole which must be considered in the context of its general proposals for research and development.

## ANNEX II

### Projet: Environment

The research and development projects proposed concern pollution and certain water treatment techniques.

They are intended mainly to provide scientific and technical backing to the European Communities programme on the environment which the Commission recently (in March 1972) proposed to the Council of Ministers. A large part of this programme is devoted to projects aimed at the reduction of pollution.

One of its aims is to establish an objective basis for the evaluation of the pollution risks faced by man and his environment, in order to define health standards and common objectives concerning quality of the environment (which will have to be reviewed periodically), to improve and harmonize methods of measuring pollution and to encourage the development of pollution control techniques.

The implementation of this programme will reveal gaps in knowledge of pollution which it will be expedient to close by means of coordinated or joint research in order to make the best use of the Member States' scientific potential and avoid duplication of effort.

The Commission is accordingly proposing, in an initial phase, the following set of research projects on the measurement of pollutants, their transport through the environment and their effects, and anti-pollution techniques:

(1) establishment of a data bank on the chemical products likely to contaminate the environment;

(2) noxious effects of lead in the atmosphere;

(3) effects on nature of the discharge of cooling water from conventional and nuclear power plants;

(4) epidemiological surveys on the effects of air and water pollution;

(5) effects of air and water micropollutants on man;

(6) evaluation of ecological effects of water pollutants;

(7) acoustic pollution;

(8) marine pollution;

(9) remote sensing of atmospheric pollution;

(10) physical model of the diffusion of air pollutants;

(11) desulphurization;

(12) treatment of certain industrial effluents.

With regard to water treatment, the Commission is proposing research and development activity aimed at increasing fresh-water resources, either by desalination of brackish water or by purification and recycling of polluted water. The effort will consist of basic and applied studies on processes using membranes, i.e., reverse osmosis and electrodialysis, and in particular on the composition of the membranes and the phenomena of diffusion of water and salts.

As the Commission is already doing in the field of radioactive pollution, it proposes to carry out the greater part of this programme by means of common or joint projects (of the association contract type), if necessary followed up by innovation and industrial development contracts. Depending on circumstances, the participants would include the Member States' research institutes, industry and the Joint Research Centre.

The cost of these vaious projects is estimated at 2 150 000 u.a. (unit of account) for the initial phase in 1973; 6 000 000 u.a. in 1974; and 7 500 000 u.a. in 1975. These figures do not include the cost of research carried out by the JRC, which is shown in Annex I.

## ANNEX III

### Projet: Materials

European research and development activity in the field of materials is both necessary and urgent because of the capital importance of materials in the economic and social development of the industrialized countries and, in particular, in most of the pacemaking technological sectors. All the industrialized countries, moreover, devote substantial budgets to scientific and technical research in the field of materials.

The projects proposed by the Commission have the primary aim of initiating a process of alignment, on as wide a scale as possible, of national programmes and activities, in the fields of both fundamental and applied research.

The second objective, which complements the first, is to launch Community research, i.e., research carried out jointly by several partners, in priority fields where gaps are noted and concerted effort is therefore important. This research should be carried out under Community scientific and technical research contracts awarded by the Commission.

Finally, the Commission is proposing to study with the Member States the creation of a European Materials Characterization Centre, which is to complement the Community Bureau of Standards already under consideration which will have wider scope than the latter. The activities of this Centre, the main task of which would be to maintain permanent links between the national institutes, would be aimed at facilitating the gradual adoption of uniform definitions of materials and, in this way, assisting the circulation and utilization of materials.

The research activities proper would be confined, in the initial period, to metallic and ceramic materials (ferrous metals being excluded because they are within the scope of the ECSC Treaty). They can be classified as follows:

— fundamental research;

— advanced materials;

- gas turbine materials;
- materials resistant to corrosion by sea water;
- materials for the electrical engineering industry;
- materials for cryogenic applications;
- materials for the aircraft industry;

- materials for the electronics industry;
- materials for chemical engineering plant;

— materials working and production techniques.

For each of the branches listed, the Commission could avail itself of opinions given by a Technical Committee composed of scientific personalities and representatives of the user industries.